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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF	:
TERUHIKO HORIGOME ET AL.	: GROUP ART UNIT: 1793
SERIAL NO.: 10/574,924	:
FILED: APRIL 7, 2008	: EXAMINER: SIKYIN, IP
FOR: COPPER-BASED ALLOY AND INGOT AND LIQUID-CONTACTING PART USING THE ALLOY	

DECLARATION UNDER 37 CFR 1.132

HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS
WASHINGTON, D.C. 20231

SIR:

Now comes Kazuhito KUROSE who declares and states that:

1. I am one of the inventors of the invention claimed in the above-identified application.

2. I graduated from Chiba Institute of Technology, Department of Metal Engineering in March, 1989. I entered KITZ CORPORATION in April, 1989 and am now an engineer of Material Development Dept. Copper Alloy Materials of said CORPORATION.

3. I have studied the Official Action of October 30, 2008 and the references cited therein, namely (1) U.S. Patent No. 5,942,056 (hereinafter referred to simply as Citation 1), (2) JP 2002-088,424 (hereinafter referred to simply as Citation 2) and (3) JP 2000-129,375 (hereinafter referred to simply as Citation 3).

4. I conducted the following Experiments in accordance with the alloys of the present invention and Citations 1, 2 and 3.

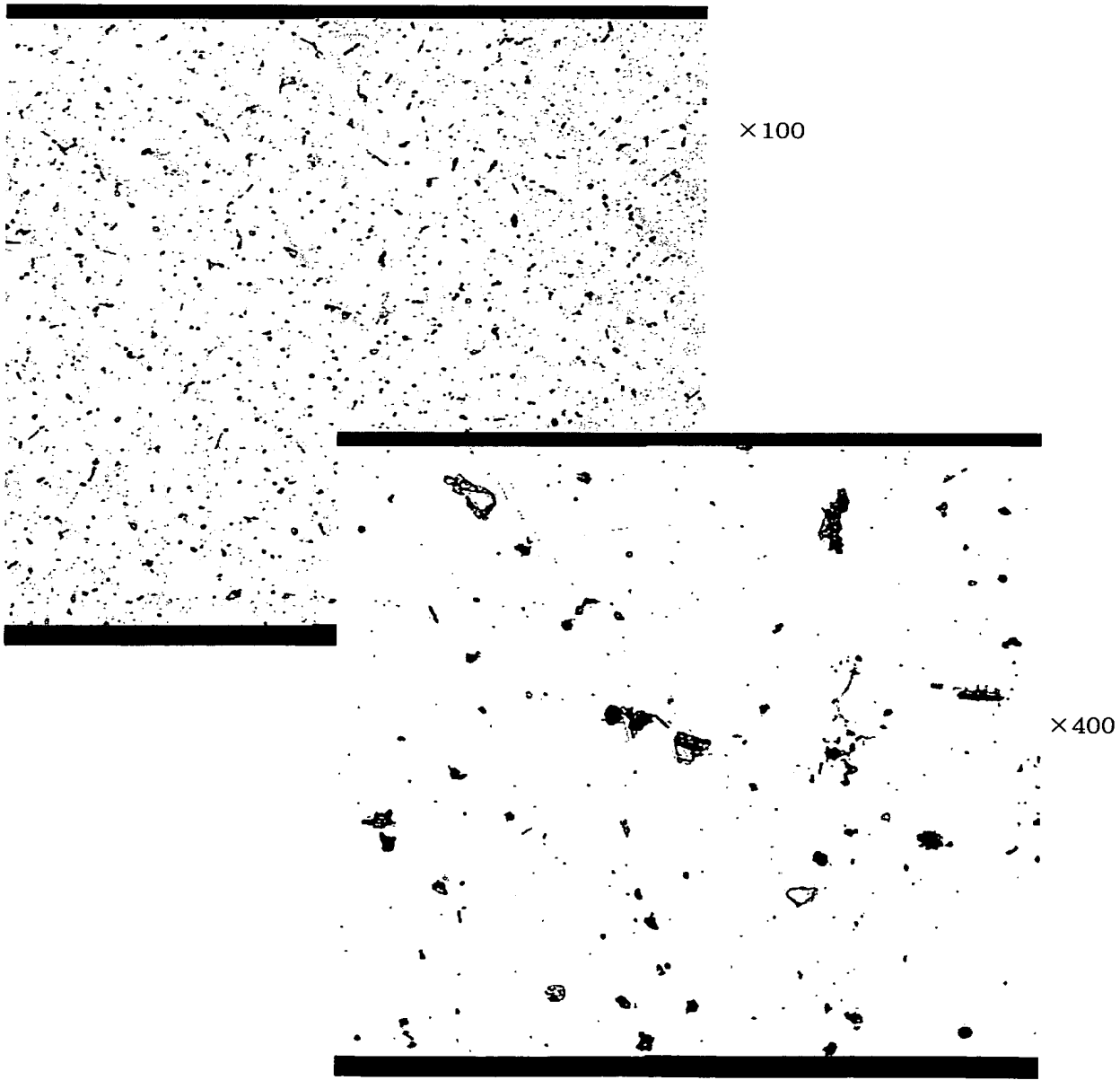
(1) Comparative Test Data No. 1 (misch metal-containing alloy):

First, 0.5 wt% of Mm (misch metal) was added to a metal melt to obtain an alloy corresponding to that of Citation 1 and evaluate the alloy thus

obtained (refer to i) Target Value in Table 1 below). Since Mm exhibits high affinity relative to Se, the two elements form a compound. Since the compound floated on the surface of the metal melt, the amount of the Se finally contained in the alloy was less than 0.01 wt% (refer to ii) Resultant Value in Table 1 below). This means that in the alloy of Citation 1 containing Mm, few ZnSe compounds are formed. As shown in photographs shown further below, it could not be confirmed that any ZnSe compound was crystallized out in the gap between the dendrites.

Table 1: Casting Test Results

	Chemical Component Value (wt%)						
	Cu	Zn	Sn	Bi	Se	Pb	Element added
i) Target Value	86.4	8.00	4.00	1.30	0.16	0.20	Mm: 0.5
ii) Resultant Value	86.5	8.13	3.93	1.21	<0.01	0.21	Mm: 0.05



(2) Comparative Test Data No. 2 (boron-containing alloy):

Next, 0.1 wt% of B (boron) was added to a metal melt to obtain an alloy corresponding to that of Citation 2 and evaluate the alloy thus obtained (refer to i) Target Value in Table 2 below, in which the contents of Zn and Se were set to fall in the ranges of the components of the present invention). As a result, it could clearly be confirmed as shown in Fig. 1 further below that eutectic Cu-B-Se alloys and Bi were present in the microstructure unlike that of the present invention. The presence of ZnSe compounds could not be confirmed in the structure as shown in the photograph of FIG. 1 because almost all Se was consumed in the Cu-B-Se eutectic reaction.

Table 2: Casting Test Results

	Chemical Component Value (wt%)						
	Cu	Zn	Sn	Bi	Se	Pb	Element added
i) Target Value	86.4	8.00	4.00	1.30	0.20	0.20	B: 0.1
ii) Resultant Value	85.7	8.03	4.14	1.36	0.20	0.00	B: 0.09

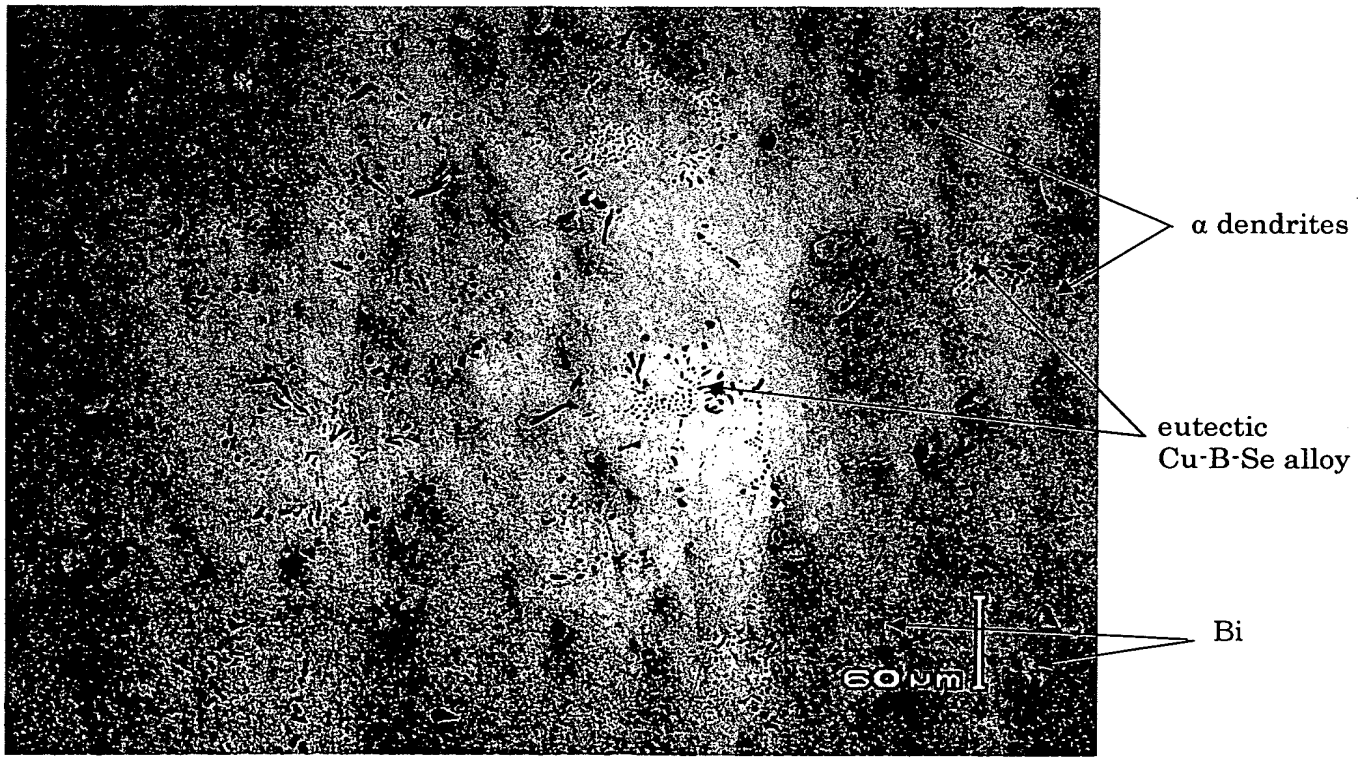


FIG. 1 Microstructure of 4%-Sn-8%-Zn-1.3%-Bi-0.2%-Se-balance-Cu alloy

In addition, an interrupted solidification test was performed in order to confirm that the Cu-B-Se of Citation 2 could fulfill the anchor effect described in the description of the present application similarly to a ZnSe compound. The interrupted solidification test is a test comprising dissolving in a furnace an alloy to be tested, water-cooling the alloy melt when the temperature has reached a target temperature while gradually cooling the alloy melt to interrupt the solidification of the alloy melt, thereby clarifying the solidification progressing mechanism at the target temperature under the following preconditions.

Alloy to be tested: 4%-Sn-8%-Zn-1.3%-Bi-0.2%-Se-0.1%-B-balance-Cu

Liquidus temperature: 995°C

Solidus temperature: 800°C

Temperature of crystallization of eutectic Cu-B-Se alloy: 947°C

FIG. 2 below shows a microstructure of the alloy that was subjected to interrupted solidification at 900°C, from which it is confirmed that residual liquid parts containing Bi as their principal component exist in the gaps between α dendrites that began their crystallization at 995°C and grew with a decrease in temperature.

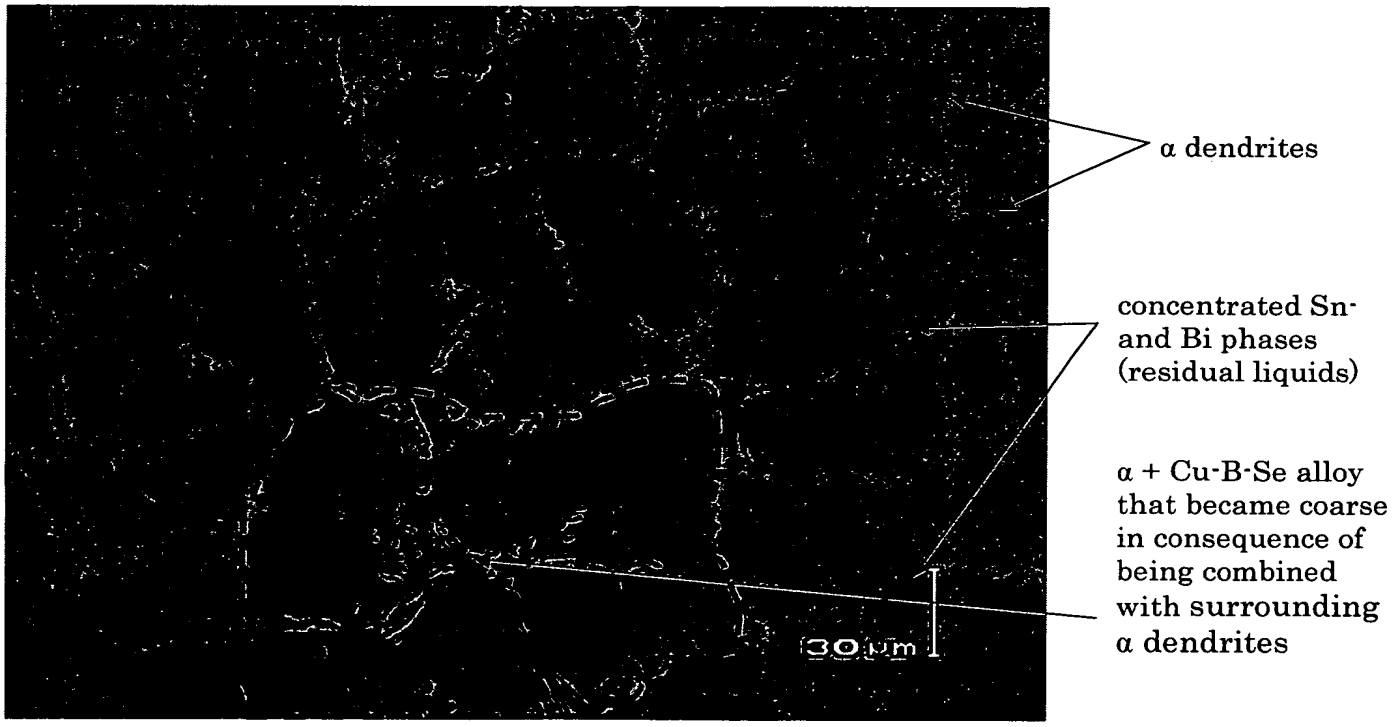


FIG. 2 Microstructure of 4%-Sn-8%-Zn-1.3%-Bi-0.2%-Se-balance-Cu alloy that was subjected to interrupted solidification at 900°C

Since the eutectic Cu-B-Se alloy shows the same degree of crystallization configuration as is clear from the comparison of FIG. 3 below in which the solidification was interrupted at 900°C with FIG. 1 above in which cooling was continued until normal temperature, it is predicted that the Cu-B-Se has already been crystallized out at 900°C. The temperature of crystallization thereof when being estimated from the results of thermal analysis is 947°C.

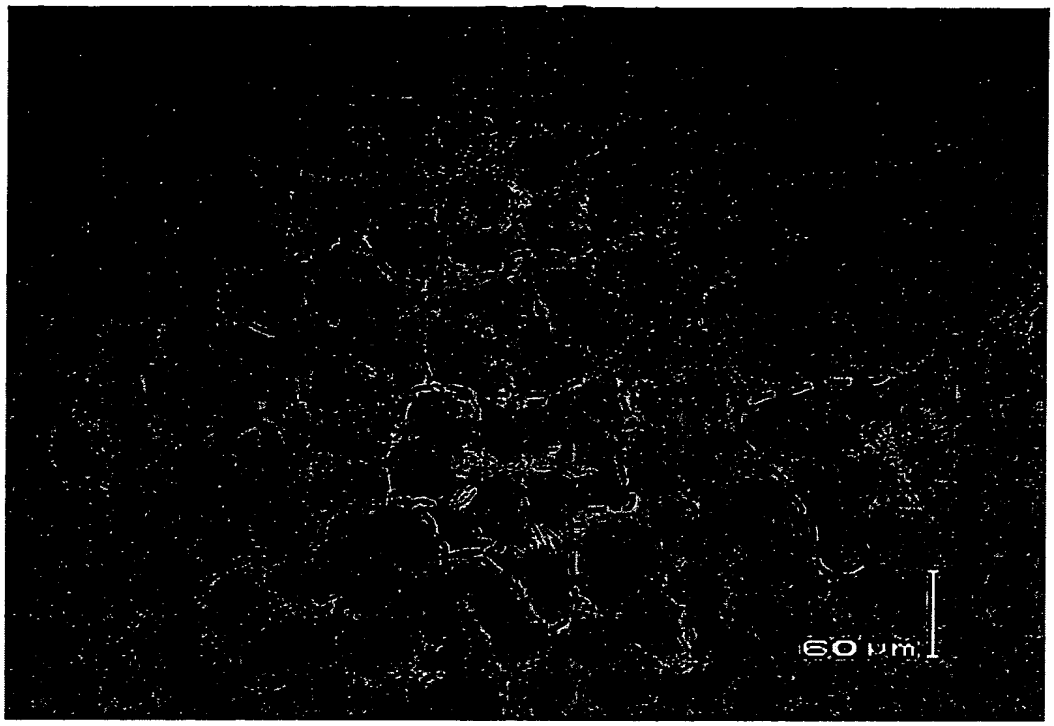


FIG. 3: Microstructure of 4%-Sn-8%-Zn-1.3%-Bi-0.2%-Se-balance-Cu alloy that was subjected to interrupted solidification at 900°C

It was also confirmed that the eutectic Cu-B-Se alloy was combined with the surrounding α dendrites to form a package coarse crystal grain.

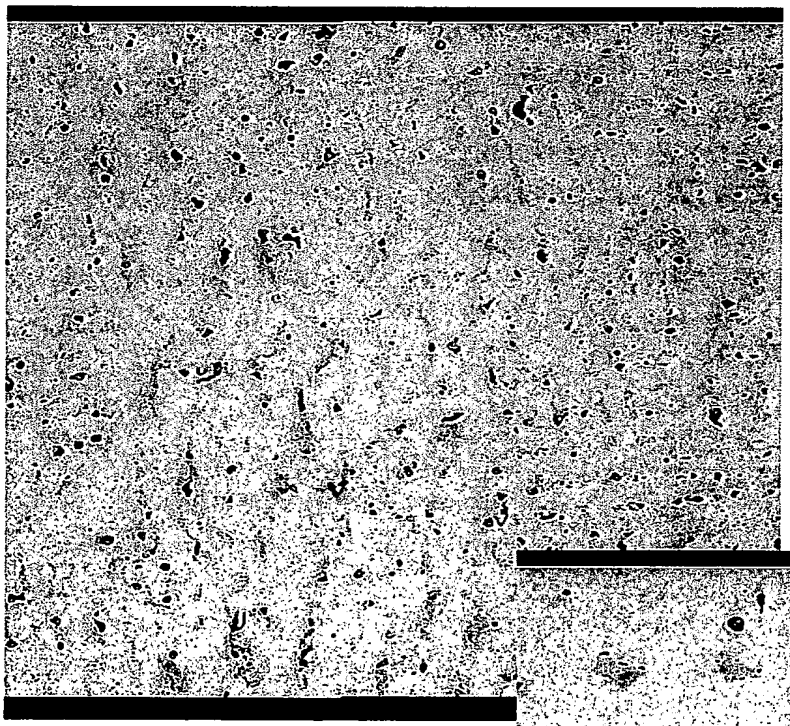
As is clear from the foregoing, in Citation 2 in which B is added, few ZnSe compounds fulfilling the aforementioned anchor effect in the alloy of the present invention and serving to disperse microporosities are crystallized out and, therefore, the alloy of Citation 2 differs in failure to fulfill the anchor effect from the alloy of the present invention.

(3) Comparative Test Data No. 3 (magnesium-containing alloy):

Moreover, 1.0 wt% of Mg (magnesium) was added to a metal melt to obtain an alloy corresponding to that of Citation 3 and evaluate the alloy thus obtained (refer to i) Target Value in Table 3 below, in which the contents of Zn and Se were set to fall in the ranges of the components of the present invention). Since Mg and Se exhibit high affinity relative to each other, they form a compound. Since the compound floated on the surface of the metal melt, the amount of Se contained finally in the alloy was 0.01 wt% (refer to ii) Resultant Value in Table 3). Few ZnSe compounds were formed and, as shown in the photographs further below, it could not be confirmed that any ZnSe compound was crystallized out in the gaps between the dendrites.

Table 3: Casting Test Results

	Chemical Component Value (wt%)						
	Cu	Zn	Sn	Bi	Se	Pb	Element added
i) Target Value	86.3	8.00	4.00	1.30	0.16	0.20	Mg: 1.0
ii) Resultant Value	86.8	7.72	3.80	1.30	0.01	0.21	Mg: 0.73



×100

×400

5. The undersigned declarant declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

6. Further declarant saith not.

April, 17, 2009
Date

Kazuhito Kurose
Signature

Kazuhito KUROSE
Name